

IVOX - The Interactive VOice eXchange Application



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What is IVOX?

- **IVOX is a real-time Internet Protocol voice communications software application capable of very low data rate operation. (600 bps to 32 kbps)**
- **IVOX can use IP multicast for network efficient voice conferencing.**
- **IVOX can operate with the emerging IETF Reservation Protocol (RSVP) to ensure Quality-of-Service (QoS) for its voice data.**
- **IVOX runs on Sun SPARC, Silicon Graphics, Linux, FreeBSD, and Hewlett Packard Unix workstations and Win32 (95/98/NT) computers. Support for Apple MacOS and other UNIX (e.g. DEC) platforms is in development.**

Why bother with Network Voice?

- **Integrated multimedia collaborative applications.**
 - Video teleconferencing
 - White boarding
 - Mission specific tools (planning, training, etc)
 - New applications.
- **More efficient, shared use of limited communication resources.**
 - Other data applications can dynamically take advantage of residual capacity left by low duty cycle voice usage.
 - Simplified management of integrated communication resources and systems.
- **Take advantage of the benefits of robust network architecture. (dynamic routing of data)**

Brief History

- **(1993-1995) Ivox originally developed for the NATO CSNI and NRL Data/Voice Integration ATD projects as a research tool**
- **(1995) Early version of Ivox included in JDISS 2.0 distribution (relabeled JVOX)**
- **Ivox used with TAMPs for collaborative aircraft mission planning in JWID '95. Also used with Nova AMRAV voice compressor peripheral.**
- **(1995 - 1997) Newlink continued enhancement of Ivox and added Linux and Win32 support.**
- **(1997) Ivox used as an integral part of the Synthetic Theater of Warfare (STOW 97) ACTD. (~100 Ivox workstations in exercise)**
- **(1998) Ivox used in Hunter Warrior and ELB projects with mobile wireless networks.**

Summary of Ivox Special Features

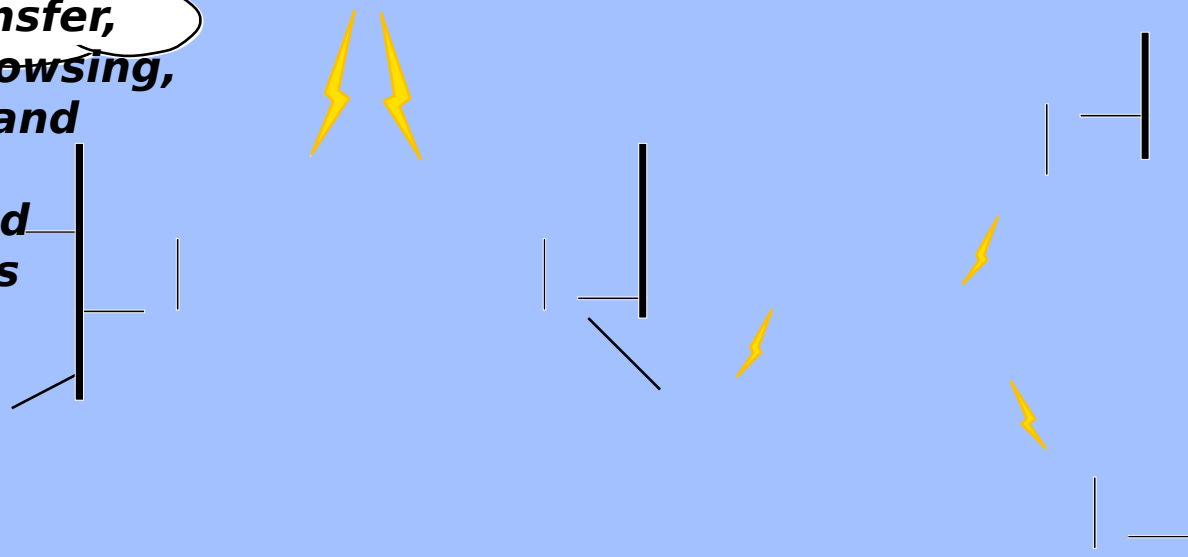
- **Low data rate, military-standard voice encoders (LPC, MELP, etc) w/ low-overhead encapsulation**
- **IP Multicast support for *group* voice communications**
- **Support for network QoS mechanisms (RSVP, IP TOS, etc)**
- **Multi-party voice mixing (e.g. someone can “cut in” in an emergency situation)**
- **WebDirectory service for point-to-point *and* multicast sessions.**
- **Simple, robust call setup protocols tuned for extreme network conditions (low bandwidth, long delay)**
- **Planned support for special interfaces to tactical voice gateways (PTT control, crypto mode selected, etc)**

IVOX in the NRL Data/Voice Integration ATD

D/V ATD

Applications:

**IVOX, Email,
file transfer,
Web browsing,
JMCIS, and
other
IP-based
services**



The “Comm Server” is a Multicast and RSVP capable IP router with specialized interfaces to NRL-developed radio subnetwork technologies.

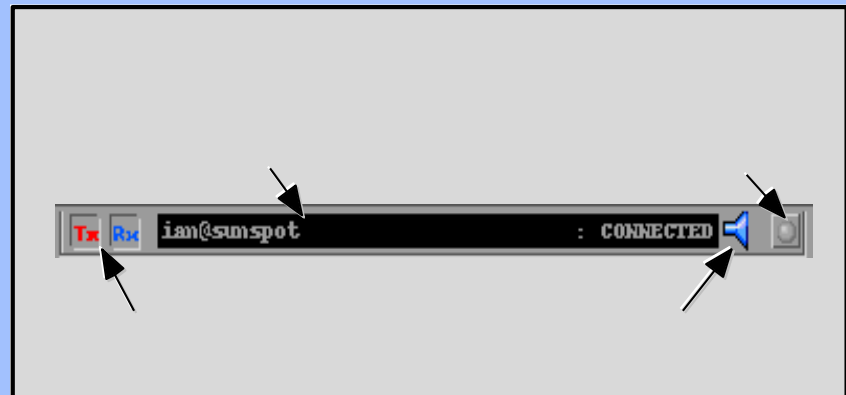
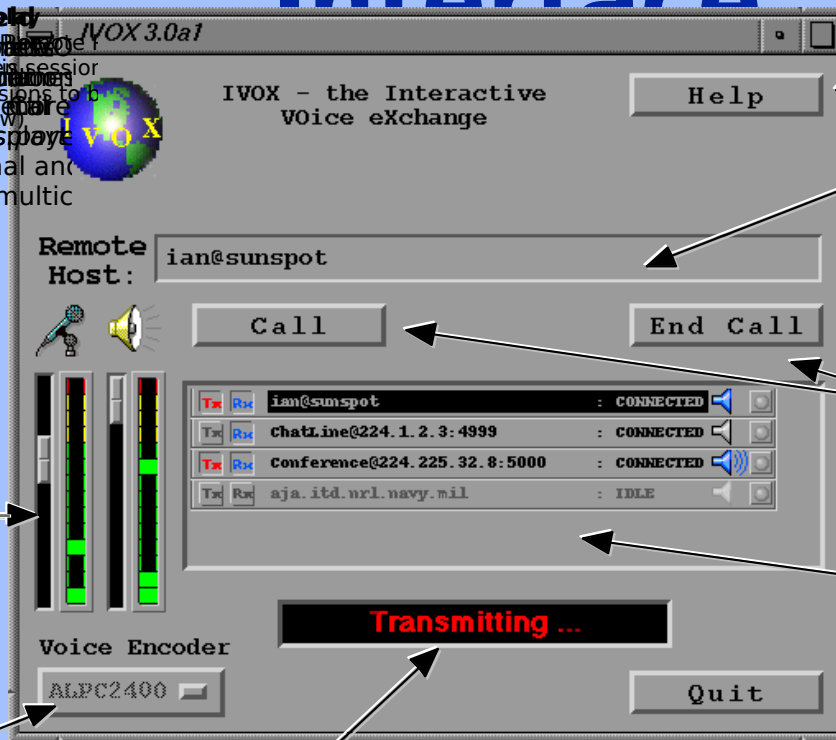
IVOX Design

- **IVOX currently runs on a number of Unix and Win32 workstations. It was designed to be easily ported to other systems.**
- **IVOX requires no special hardware. It uses the standard audio capabilities of current generation workstations.**
- **The voice compression algorithms runs in real-time on workstations and PCs.**
- **The software is capable of interfacing to dedicated hardware vocoders to free up CPU time or run on less powerful (or audio-impaired) workstations.**

IVOX Graphical User Interface

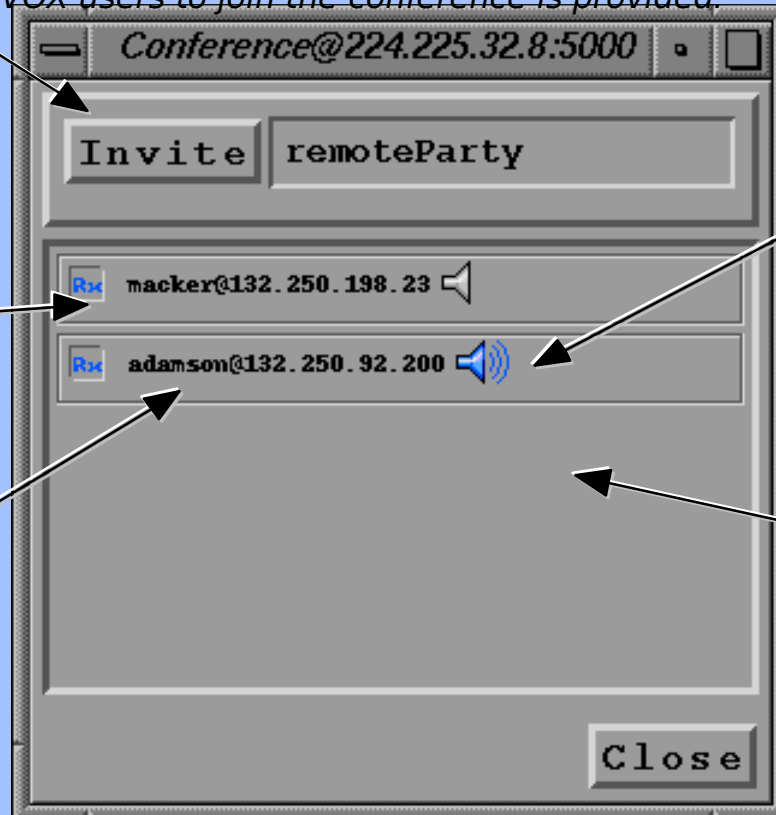
Full Sunspot functionality

Full Sunspot functionality is available in the main session window. The main session window is the primary interface for building and managing conference sessions. It includes a list of active sessions, a status bar, and a control panel. The status bar shows the current session's status (e.g., Transmitting ...). The control panel includes buttons for Call, End Call, and Quit, as well as a Voice Encoder dropdown menu.



IVOX Conference Window

This type of window is displayed when the user <double-clicks> on the name of a multicast conference in the session display of the IVOX main window. The primary purpose of this window is to display a listing of conference members and their activity which is dynamically updated as the conference proceeds. Controls for selectively muting conference members and for inviting other IVOX users to join the conference is provided.



Ivox Web Directory

NetScape: IVOX Web Directory

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Location: <http://www.ngcc.com/ivox/WebDirectory/>

IVOX[tm] Web Directory

[Display Web Directory](#) [Search Web Directory](#) [Register As User](#) [IVOX Home Page](#)

Select	Name	Organization	Phone	Email	IVOX
▼	Adamson, Brian	Newlink	(202) 404-1194	Send Email	Place Call
▼	Dunn, Bob	JBC	(757) 686-7551	Send Email	Place Call
▼	Felbus, Mike	-	602-998-8151	Send Email	Place Call
▼	Gossard, Thomas	-	703-271-7426	Send Email	Place Call
▼	Gregory, Paul	Newlink	703-971-3303 Ext 104	Send Email	Place Call
▼	Gribaudo, Mike	Newlink	703-971-3303	Send Email	Place Call
▼	Iodice, David	Newlink	407.676.5664	Send Email	Place Call
▼	Kepuschansky, Scott	NRL	(202) 767-0084	Send Email	Place Call
▼	Kippenbrock, Frank	Newlink	703-971-3303	Send Email	Place Call
▼	Knight, Alfred	JBC	(757) 686-7462	Send Email	Place Call
▼	Kutchinski, David P.	Newlink	(703) 971-3303	Send Email	Place Call
▼	Local Intercom.	-	-	Not Avail	Place Call
▼	Macher, Joe	NRL	(202) 767-2001	Send Email	Place Call
▼	McCubbin, Don	Newlink	703-971-3303	Send Email	Place Call

100%

Ivox Gateway Options

- In the STOW ACTD, IVOX was interfaced to Push-to-Talk controlled intercom systems.
- Ivox has been used demonstrate end-to-end digital interoperability with ANDVT/TACTERM (in plaintext mode)
- Ivox's eventual support for H.323 will allow for interoperability with commercially available telephone/VTC gateways and other voice terminals (e.g. NetMeeting)
- A simple POTS gateway will be developed for ELB demonstrations.
- Ongoing work at NRL with shipboard secure voice technology will examine gateway options to support packet voice.
- A gateway capability from H.323/POTS to low rate Ivox sessions is planned.

Work in Progress

- **ITU H.323 and IETF IP Telephony compatibility and interoperability.**
- **Dynamic IP address resolution via directory services.**
- **Additional voice codecs (e.g. MELP, IS54)**
- **Support for operation with firewalls.**
- **Security options. (Call authentication and voice privacy)**
- **Telephony and tactical voice net gateway support.**
- **Optional non-multicast conferencing operation.**

IVOX Future Directions

- **More advanced user interface features. (e.g. address book, access to directory services such as LDAP, ILS, etc)**
- **Advanced multi-session controls. (e.g. spatial panning/placement of differe users' voice)**
- **Integration with other collaborative applications (Reliable multicast white boarding and remote presentation).**
- **Further experiments with quality-of-service Reservation Protocol (RSVP) and multicast session management.**
- **Support for operation over native ATM networks.**
- **Continued research and development with applicable data, voice, and network security technologies.**
- **Advanced directory service features.**
- **Continued application in tactical and mobile network environments.**

Ivox Status

- **Beta versions of Ivox are freely available at**
<<http://www.ngec.com/ivox>>
and
<<http://manimac.itd.nrl.navy.mil>>
- **Continued development and enhancements to Ivox, including commercial support and availability, are being conducted by Newlink Global Engineering Corporation, Springfield VA.**
- **For more information, email:**
“ivox@newlink.net”